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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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| <b>(51) International Patent Classification <sup>7</sup> :</b><br><b>G03C 1/73, H04H 9/00</b>   | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 00/17709</b><br><b>(43) International Publication Date:</b> 30 March 2000 (30.03.00)   |
| <b>(21) International Application Number:</b> PCT/GB99/03097<br><b>(22) International Filing Date:</b> 17 September 1999 (17.09.99)<br><b>(30) Priority Data:</b><br>9820317.7 18 September 1998 (18.09.98) GB<br><b>(71) Applicant (for all designated States except US):</b> CPFILMS INC.<br>[US/US]; P.O. Box 5068, Martinsville, VA 24115 (US).<br><b>(72) Inventors; and</b><br><b>(75) Inventors/Applicants (for US only):</b> HAWKINS, Michael<br>[GB/GB]; 18 Mount Nod Way, Coventry CV5 7GX (GB).<br>NEWBITT, David, Michael [GB/GB]; 15 Hann Road,<br>Rownhams, Southampton SO16 8LN (GB).<br><b>(74) Agent:</b> HALE, Stephen, Geoffrey, J.Y. & G.W. Johnson,<br>Kingsbourne House, 229-231 High Holborn, London<br>WC1V 7DP (GB). |           | <b>(81) Designated States:</b> AE, AL, AM, AT, AU, AZ, BA, BB, BG,<br>BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE,<br>ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP,<br>KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD,<br>MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD,<br>SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US,<br>UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS,<br>MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ,<br>BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE,<br>CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,<br>NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA,<br>GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.</i> |
| <b>(54) Title:</b> PHOTSENSITIVE PLASTICS FILMS AND INFORMATION STORAGE DEVICES   |           |  |
| <b>(57) Abstract</b><br><br>A plastics film is provided which is filled with a filler, has diffuse reflective properties and is coated with a coating containing a photosensitive organic compound. The film is useful in the production of information storage devices by combining it with a perforated mask disposed on the side of the film which bears the coating.  |           |  |

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PHOTOSENSITIVE PLASTICS FILMS  
AND INFORMATION STORAGE DEVICES

Field of the invention

This invention relates to polymeric films comprising  
5 photosensitive, particularly photochromic, organic  
compounds, which films exhibit a high response to exposure  
to electromagnetic radiation, particularly visible light,  
and to information storage devices incorporating such films.

As used herein, the unqualified expression "light"  
10 refers generally to electromagnetic radiation in the UV-  
visible region, and "colour" refers generally to the  
spectral properties within the UV-visible region of light or  
of an article.

Background art

15 WO-A-94/24785 discloses an information storage device  
comprising a photosensitive film for application to a small  
region of a monitor such as a television screen. The  
photosensitive material in the film may be photochromic. The  
photosensitive film may be metallised with gold or silver on  
20 its reverse side, both to guard the photosensitive material  
from light falling on the reverse side of the film, and to  
reflect light falling on the obverse side of the film but  
passing through the film without interacting with the  
photosensitive material back towards the photosensitive  
25 material. The film may be provided on its obverse side with  
a lens to focus light falling on the film and thus to yield  
a sharp image.

In some information-collecting applications, an image  
30 consisting of discrete spots (as opposed to a continuous  
image) may be found suitable. In such a case the obverse  
side of the film may advantageously be provided with a  
perforated mask, for example of cardboard, as focusing  
device instead of a plastics lens. The mask may be markedly  
35 thicker than the film, so that the photosensitive material  
is activated only by light falling on the storage device at

a near-perpendicular angle to the film. The desirability of employing a photosensitive material of high sensitivity will be appreciated, namely in order that a large colour difference between exposed and unexposed areas can be obtained in a short exposure time. However, there may be problems in reading the information which has been collected in a storage device of such construction. The reading step involves illumination with light of wavelength characteristic of the photosensitive material (unexposed or exposed) and analysis of the reflected light. If the photosensitive film is unreflective (either because the film has no backing or because the film has light-absorbent properties), the amount of reflected light is low. If the film is highly reflective, for example if it is metallised on its reverse side, the amount of reflected light is so great that it is difficult to distinguish between exposed and unexposed areas. The present invention addresses such problems.

#### Disclosure of the invention

According to the invention, there is provided a plastics film filled with a filler and having diffuse reflective properties, the film bearing a coating which contains a photosensitive organic compound.

The plastics film may be of conventional polymeric material such as regenerated cellulose, cellulose acetate or polyamide, although a polyester such as poly(ethylene terephthalate) may be preferred. The polymer desirably exhibits high transparency at relevant wavelengths.

The filler is preferably a pigment, more preferably a white pigment. Titanium dioxide (titania) is a particularly preferred white pigment for use when the photosensitive compound is chosen to react on exposure to visible light, because of its good diffuse reflective properties to visible light. Other common white pigments such as barium sulphate tend to confer a relatively high degree of specular

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reflection to visible light on a filled film, and they are accordingly less preferred. On the other hand, if the compound is chosen to react on exposure to UV light, barium sulphate may be preferred to titania, because barium sulphate exhibits better diffuse reflectivity than titania to UV light. Other kinds of filler, for example polymer beads, may be employed. If an aerated or microvoided polymeric film is employed, the filler is generally a gas such as air. A decisive factor is that the refractive index of the filler particles (or voids) should differ from that of the polymer of the film so as to confer diffuse reflective properties on the film. The size and shape of the particles (or voids) may also be influential. The nature of the filler and filled film are not thought to affect the photochemistry of the photosensitive compound and accordingly are not thought to modify the nature of the information collecting step.

The diffuse and specular reflective properties of a film may be measured by conventional techniques, for example using a UV-visible spectrometer equipped with an integrating sphere for reflectance measurement and an optional light trap for removal of the specularly-reflected component. At relevant wavelengths, the plastics film preferably exhibits a diffuse reflectivity of at least 80%, more preferably at least 85%, and a specular reflectivity of no more than 5%, preferably of no more than 3% (all percentages being based on the reflectivity of a standard barium sulphate plate).

The coating may comprise more than one photosensitive organic compound. The photosensitive compound is preferably a photochromic compound. Photochromic organic compounds are known and include the photochromic fulgides and diarylethenes. Such compounds change colour when exposed to light whose wavelength corresponds to a spectral absorption peak of the compound. This colour change is the result of isomerisation, and it is reversed if the isomerised compound is exposed to light whose wavelength corresponds to a

spectral absorption peak of the isomerised compound. The efficiency of the isomerisation reaction differs for different compounds, depending on the efficiency with which the molecule absorbs photons and on the efficiency with which the molecule isomerises after absorption of a photon. The invention preferably employs a photochromic compound which reacts with a high degree of efficiency, most preferably in both the forward direction and the reverse direction. The photochromic compound preferably has a low tendency to thermochromism (colour change resulting from heat-induced isomerisation). The photochromic compound preferably strongly absorbs light from one or more of the RGB guns in a conventional television. A preferred compound is the fulgide Aberchrome 670 (Trade Mark of Aberchromics Ltd.) (CAS Registry No. 94856-25-4), which exhibits a rapid colour change (is rapidly bleached) by exposure to light of wavelength around 530 nm (corresponding to the green gun).

The coating preferably comprises a polymer in which the photosensitive compound is dispersed at molecular level. In general, any polymer compatible with the compound may be used. It will be appreciated that polymers which absorb light at relevant wavelengths, or which may react with the compound, or in which the compound may crystallise, will in general be unsuitable. An olefinic polymer such as polystyrene may generally be found suitable. The polymer of the coating desirably exhibits high transparency at relevant wavelengths. Coating compositions may be made for example by dissolving the polymer and compound in a solvent, and such compositions may be applied to the film by conventional techniques such as gravure printing or other printing methods.

The film is preferably metallised on its reverse side. Metallisation serves primarily to guard the photosensitive compound from light falling on the reverse side of the film and secondarily to provide a reflective surface from which light passing through the film can be reflected back towards

the photosensitive compound through the diffuse reflective film in the information collecting step. The efficiency of light collection may in consequence be increased by some 10 or 20 percent.

5       The invention further provides an information storage device which comprises in combination the film described hereinabove and a perforated mask disposed on the coating-bearing side of the film. The mask may for example be perforated with holes of from 1 to 5 mm diameter. The  
10 thickness of the mask may for example be from 0.5 times to 2.5 times the diameter of the holes.

An information storage device according to the invention has the advantage that instrumental measurement of the colour of the film is markedly easier than in a device  
15 which incorporates a film which exhibits highly specular reflective properties or which exhibits little or no reflective properties. Measurement involves the analysis of light reflected from the film, and if the film exhibits excessive specular reflection the instrument may be swamped  
20 with reflected light owing to the fact that both the incident and the reflected light travel at near-perpendicular angle to the film.

Photosensitive compounds such as photochromic compounds are expensive materials. It is both economic and  
25 technically efficient to confine application of the photosensitive compound by applying the coating containing the photosensitive compound in the form of spots corresponding to the holes in the mask. The diameter of the spots is preferably larger than the diameter of the holes  
30 for maximum efficiency of light capture and to allow some latitude in registration.

The coating may comprise a small amount, for example 0.5 to 2% by weight, of a non-photosensitive light-absorbing compound. This has the advantage that the spots can be

recognised instrumentally by spectral measurement at a fixed wavelength corresponding to an absorption peak of the non-photosensitive compound, irrespective of the current colour of the photosensitive compound. If this compound absorbs visible light, the spots can be visually recognised even when the photosensitive compound is in visually colourless form. The non-photosensitive compound should be of low absorbance at wavelengths at which the photosensitive compound is of high absorbance in either isomeric state.

- 10 The invention is illustrated by the following Example, in which parts and proportions are by weight except where otherwise specified:-

#### Example

A coating composition was prepared by dissolving 17.98 g Aberchrome 670 (Trade Mark of Aberchromics Limited), 1.19 g Waxoline Yellow GFW (Trade Mark of BASF AG) and 53.94 g polystyrene (Lacqrene 1810, Trade Mark of Elf Atochem) in 327.64 g 70:30 toluene/methylethylketone. The composition was applied by gravure printing to a titania-filled polyethylene terephthalate film (Melinex 365, Trade Mark of Du Pont), which had been metallised on the heatseal side. (Melinex 365 comprises a filled poly(ethylene terephthalate) film 23 micron thick coated on one side with amorphous unfilled poly(ethylene isophthalate)/poly(ethylene terephthalate) 3 micron thick as heatseal layer. The heatseal layer is not thought to be of any relevance in the present invention.) The composition was applied in the form of circular spots of about 7 mm diameter. The spots were disposed in groups of 16, comprising concentric circles of 6 spots in an inner circle and 10 spots in an outer circle, the diameter of the outer circle being about 4 cm. The groups were disposed in regular square array at a density of about 310 groups per square metre. The total coating weight in the coated areas was 1.417 g/sq.m, of which 0.354 g/sq.m was Aberchrome 670. The film was also marked with



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registration marks to aid in subsequent laminating, stamping and slitting processes. On exposure to UV light (UV-A from 5 x 8W Philips Blacklight tubes), the spots turned from yellow to deep brown (colouration mode). The colour change was reversed (bleaching mode) by exposure to ambient room lighting in a short time of about 10 min.

An information storage device was made by joining together in the following order:

- (1) a paper backing layer;
- 10 (2) the film described above, with its metallised surface towards the paper layer; and
- (3) two layers of cardboard each 2 mm thick, perforated with 2.8 mm diameter holes corresponding to the spots on the film,

15 all being 40 mm diameter discs.

A similar film and device were prepared using a barium sulphate-filled poly(ethylene terephthalate) film (Melinex 329, Trade Mark of Du Pont). The instrumentally-measured difference between this device before and after exposure to 20 a given amount of visible light was less than it was for the device containing the titania-filled film.

In a comparative experiment was tested an acetate film containing Aberchrome 670 in solid solution. The bleaching rate was slow in comparison with either of the filled films. 25 It is thought that this was because the absence of a reflective backing resulted in less efficient photon capture.

The specular and diffuse reflective properties of poly(ethylene terephthalate) films filled with titania and 30 with barium sulphate were measured using a Perkin-Elmer Lambda 9 (Trade Mark) UV-visible-NIR spectrophotometer equipped with an integrating sphere for reflectance

measurement and an optional light trap for removal of the specularly-reflected component. The results were expressed as percentages of the reflectivity of a standard barium sulphate plate supplied by Perkin-Elmer. The relative amounts of specular and diffuse reflection were similar over the range from about 420 to 700 nm, although the total amount of reflection declined steadily with increasing wavelength. The following results were obtained at 560 nm:

| Filler          | Diffuse reflection% | Specular reflection % |
|-----------------|---------------------|-----------------------|
| 10 Titania      | 85                  | 2.5                   |
| Barium sulphate | 83.5                | 5                     |

CLAIMS

1. A plastics film filled with a filler and having diffuse reflective properties, the film bearing a coating which contains a photosensitive organic compound.
- 5 2. A film as claimed in claim 1, wherein the photosensitive organic compound is a photochromic compound.
3. A film as claimed in claim 2, wherein the photochromic compound is a fulgide or diarylethene.
4. A film as claimed in any of claims 1 to 3,  
10 wherein the photosensitive organic compound is dispersed at molecular level in a coating of a polymer which is compatible with the compound but does not reach with it nor cause it to crystallise nor substantially absorb light of wavelengths to which the photosensitive compound is  
15 sensitive.
5. A film as claimed in claim 4, wherein the polymer is polystyrene.
6. A film as claimed in any of claims 1 to 5, which bears the coating containing a photosensitive organic  
20 compound on one side and is metallised on its reverse side.
7. A film as claimed in any of claims 1 to 6, wherein the filler is a white pigment.
8. A film as claimed in any of claims 1 to 7, which has a diffuse reflectivity of at least 85% and a specular  
25 reflectivity of no more than 3%, based on the reflectivity of a standard barium sulphate plate.
9. A film as claimed in any of claims 1 to 8, containing from 0.5 to 2% by weight based on the coating of

a non-photosensitive, light-absorbing compound.

10. An information storage device which comprises in combination a film according to any of claims 1 to 9 and a perforated mask disposed on the coating-bearing side of the film.

11. An information storage device as claimed in claim 10, wherein the mask is perforated with holes of diameter 1 to 5mm and has a thickness of 0.5 to 2.5 times the diameter of the holes.

## INTERNATIONAL SEARCH REPORT

National Application No

PCT/GB 99/03097

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 G03C1/73 H04H9/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G03C H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| X          | WO 94 12352 A (DSM)<br>9 June 1994 (1994-06-09)   | 1-5, 7, 8,<br>10      |
| Y          | page 7, line 5 - line 16<br>page 11, line 32 - page 12, line 31<br>page 21, line 3 - line 7; claims<br>1-3, 6, 17, 21                                       | 6, 9, 11              |
| Y          | EP 0 711 046 A (HOHENACKER)<br>8 May 1996 (1996-05-08)<br>column 1, line 3 - line 9<br>column 3, line 14 - column 4, line 19<br>column 5, line 35 - line 38 | 6, 11                 |
| Y          | GB 600 999 A (ICI)<br>23 April 1948 (1948-04-23)<br>page 1, line 35 - line 37<br>page 1, line 72 - line 76<br>page 3, line 70 - line 80; claim 8            | 6, 9                  |
|            | ---<br>-/--   |                       |



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

3 December 1999

Date of mailing of the international search report

13/12/1999

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

onal Application No

PCT/GB 99/03097

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| Y          | <p>WO 91 12139 A (COURTAULDS)<br/> 22 August 1991 (1991-08-22)<br/> page 1, line 3 - line 7<br/> page 3, line 8 - line 23<br/> page 7, line 1 - line 25<br/> page 20, line 28 -page 21, line 9<br/> -----</p> | 11                    |

# INTERNATIONAL SEARCH REPORT

tion on patent family members

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PCT/GB 99/03097

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) |            | Publication<br>date |
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|   |   |                     | AU                         | 7337591 A  | 03-09-1991          |

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

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01 May 2000 (01.05.00)

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PCT/GB99/03097

Applicant's or agent's file reference  
PA 3382

International filing date (day/month/year)  
17 September 1999 (17.09.99)

Priority date (day/month/year)  
18 September 1998 (18.09.98)

## Applicant

HAWKINS, Michael et al

1. The designated Office is hereby notified of its election made:

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24 March 2000 (24.03.00)

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## PCT INTERNATIONAL COOPERATION TREATY

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NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
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From the INTERNATIONAL BUREAU

To:

HALE, Stephen, Geoffrey  
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Kingsbourne House  
229-231 High Holborn  
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ROYAUME-UNIDate of mailing (day/month/year)  
22 March 2001 (22.03.01)Applicant's or agent's file reference  
PA 3382International application No.  
PCT/GB99/03097

## IMPORTANT NOTIFICATION

International filing date (day/month/year)  
17 September 1999 (17.09.99)

## 1. The following indications appeared on record concerning:

☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative

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## 3. Further observations, if necessary:

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1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

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## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

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|---|--|
| Date of mailing (day/month/year)<br>07 December 1999 (07.12.99) | IMPORTANT NOTIFICATION   |
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| International application No.<br>PCT/GB99/03097                 | International filing date (day/month/year)<br>17 September 1999 (17.09.99) |

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 ☒ the name
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## State of Residence

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|--|--|
| <input checked="" type="checkbox"/> the receiving Office                   | <input checked="" type="checkbox"/> the designated Offices concerned |
| <input checked="" type="checkbox"/> the International Searching Authority  | <input type="checkbox"/> the elected Offices concerned               |
| <input type="checkbox"/> the International Preliminary Examining Authority | <input type="checkbox"/> other:                                      |

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

I. Britel

Telephone No.: (41-22) 338.83.38

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

15

|  |   |  |
|--|---|--|
| Applicant's or agent's file reference<br>PA 3382   | <b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |  |
| International application No.<br>PCT/GB99/03097  | International filing date (day/month/year)<br>17/09/1999  | Priority date (day/month/year)<br>18/09/1998 |
| International Patent Classification (IPC) or national classification and IPC<br>G03C1/73 |   |  |
| Applicant<br>CPFILMS INC. et al.   |   |  |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

|   |   |
|---|---|
| Date of submission of the demand<br><br>24/03/2000  | Date of completion of this report<br><br>18.12.2000   |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office<br>D-80298 Munich<br>Tel. +49 89 2399 - 0 Tx: 523656 epmu d<br>Fax: +49 89 2399 - 4465 | Authorized officer<br><br>Stock, H<br><br>Telephone No. +49 89 2399 8458<br> |

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB99/03097

**I. Basis of the report**

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

**Description, pages:**

1-8 as originally filed

**Claims, No.:**

1-11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB99/03097

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

|                               |      |        |            |
|-------------------------------|------|--------|------------|
| Novelty (N)                   | Yes: | Claims | 6,9,11     |
|                               | No:  | Claims | 1-5,7,8,10 |
| Inventive step (IS)           | Yes: | Claims |            |
|                               | No:  | Claims | 1-11       |
| Industrial applicability (IA) | Yes: | Claims | 1-11       |
|                               | No:  | Claims |            |

2. Citations and explanations  
**see separate sheet**

## VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

**Item V**

- 1 WO-A-94/12352 (D1) discloses a polymer composition which contains at least one photosensitive compound, e.g. a fulgide or diarylethylene compounds dispersed in a compatible binder such as polystyrene. In a particular embodiment, the radiation sensitive component(s) may be inhomogeneously distributed in the polymer by applying a multi-layer technique; the extruded or cast film may further contain fillers such as barium sulphate and is used to record superficial markings by irradiation through a mask (cf. page 7, lines 11-12; page 9, lines 21-27; page 11, lines 2-8 and 20-24; page 12, lines 32-36; Example IX).  
Thus, D1 is prejudicial to the novelty of claims 1-5,7,8 and 10.
- 2 D1 represents closest prior art.  
Claim 6 differs from D1 only in that a reflective backing layer is used in combination with a bi-layer structure which concentrates the photosensitive compound on the surface of the film. Both features can only be regarded as routine measures in the art of image recording, see. e.g EP-A-711 046 (D2), column 5, lines 24-38 and claim 7.  
Claim 9 is characterized by light absorbing compounds, apparently intended to absorb stray light. Without referring to a particular document, it is held that this feature represents a routine measure in the art.  
The significance of the feature of claim 11 is exhaustively explained in the passage from column 3, line 14 to column 4, line 19 of D2.

**Item VIII**

The embodiment described on page 3, lines 6-13 comprising a voided film is not covered by the claims because voids do not represent fillers in common technical parlance although they provide a phase which may, but need not necessarily have a different refractive index.

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

|  |   |  |
|--|---|--|
| Applicant's or agent's file reference<br><b>PA 3382</b>  | <b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. |  |
| International application No.<br><b>PCT/GB 99/ 03097</b> | International filing date (day/month/year)<br><b>17/09/1999</b>   | (Earliest) Priority Date (day/month/year)<br><b>18/09/1998</b> |
| Applicant<br><br><b>CP FILMS INC. et al.</b>             |   |  |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 03 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ Non of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03097

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 G03C1/73 H04H9/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G03C H04H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| X          | W0 94 12352 A (DSM)<br>9 June 1994 (1994-06-09)   | 1-5,7,8,<br>10        |
| Y          | page 7, line 5 - line 16<br>page 11, line 32 - page 12, line 31<br>page 21, line 3 - line 7; claims<br>1-3,6,17,21  | 6,9,11                |
| Y          | EP 0 711 046 A (HOHENACKER)<br>8 May 1996 (1996-05-08)<br>column 1, line 3 - line 9<br>column 3, line 14 - column 4, line 19<br>column 5, line 35 - line 38 | 6,11                  |
| Y          | GB 600 999 A (ICI)<br>23 April 1948 (1948-04-23)<br>page 1, line 35 - line 37<br>page 1, line 72 - line 76<br>page 3, line 70 - line 80; claim 8            | 6,9                   |
|            | -/-   |                       |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

3 December 1999

Date of mailing of the international search report

13/12/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 661 epo nl,  
 Fax: (+31-70) 340-3018

Authorized officer

Magrizos, S



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 99/03097

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No. |
|------------|--|-----------------------|
| Y          | <p>W0 91 12139 A (COURTAULDS)<br/> 22 August 1991 (1991-08-22)<br/> page 1, line 3 - line 7<br/> page 3, line 8 - line 23<br/> page 7, line 1 - line 25<br/> page 20, line 28 -page 21, line 9</p> | 11                    |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 99/03097

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---|---------------------|----------------------------|---------------------|
| WO 9412352                                | A | 09-06-1994          | NL 9202096 A               | 01-04-1993          |
|   |   |                     | AU 5719194 A               | 22-06-1994          |
| EP 711046                                 | A | 08-05-1996          | DE 4439264 A               | 09-05-1996          |
|   |   |                     | AU 685007 B                | 08-01-1998          |
|   |   |                     | AU 3664895 A               | 09-05-1996          |
|   |   |                     | AU 3846495 A               | 31-05-1996          |
|   |   |                     | CA 2162070 A               | 04-05-1996          |
|   |   |                     | CN 1168750 A               | 24-12-1997          |
|   |   |                     | WO 9614698 A               | 17-05-1996          |
|   |   |                     | HU 77274 A                 | 02-03-1998          |
|   |   |                     | JP 10508729 T              | 25-08-1998          |
|   |   |                     | PL 319971 A                | 01-09-1997          |
|   |   |                     | US 5790169 A               | 04-08-1998          |
| GB 600999                                 | A |                     | NONE                       |                     |
| WO 9112139                                | A | 22-08-1991          | GB 2242993 A               | 16-10-1991          |
|   |   |                     | AU 7337591 A               | 03-09-1991          |

The demand must be filed directly with the competent International Preliminary Examining Authority if two or more Authorities are competent, with the one chosen by the applicant. The one or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ \_\_\_\_\_

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:  
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

| For International Preliminary Examining Authority use only   |  |   |
|--|--|---|
| Identification of IPEA   |  | Date of receipt of DEMAND   |
| <b>Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION</b>   |  | Applicant's or agent's file reference<br>PA 3382                                |
| International application No.<br>PCT/GB99/03097  | International filing date (day/month/year)<br>17th September 1999<br>(17.09.99.) | (Earliest) Priority date (day/month/year)<br>18th September 1998<br>(18.09.98.) |
| Title of invention<br>PHOTOSENSITIVE PLASTICS FILMS AND INFORMATION STORAGE DEVICES  |  |   |
| <b>Box No. II APPLICANT(S)</b>   |  |   |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)<br><br>CPFilms Inc<br>P.O. Box 5068,<br>Martinsville,<br>VA 24115,<br>U.S.A.                              |  | Telephone No.:  |
|  |  | Facsimile No.:  |
|  |  | Teleprinter No.:  |
| State (that is, country) of nationality:<br>United States of America   |  | State (that is, country) of residence:<br>United States of America              |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)<br><br>HAWKINS, michael<br>18 Mount Nod Way,<br>Coventry,<br>CV5 7GX,<br>United Kingdom.                  |  |   |
| State (that is, country) of nationality:<br>United Kingdom   |  | State (that is, country) of residence:<br>United Kingdom                        |
| Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)<br><br>NEUBITT, David Michael<br>15 Hann Road,<br>Rownhams,<br>Southampton<br>SO16 8LN,<br>United Kingdom |  |   |
| State (that is, country) of nationality:<br>United kingdom   |  | State (that is, country) of residence:<br>United Kingdom                        |
| <input type="checkbox"/> Further applicants are indicated on a continuation sheet.   |  |   |

**Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation.  
The address must include postal code and name of country.)*HALE, Stephen Geoffrey  
J.Y. & G.W. Johnson  
Kingdbourne House,  
229-231 High Holborn,  
London WC1V 7DP,  
United Kingdom.

Telephone No.:

020 7405 0356

Facsimile No.:

020 7831 9628

Teleprinter No.:

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:\***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filedthe description ☐ as originally filed☐ as amended under Article 34the claims ☐ as originally filed☐ as amended under Article 19 (together with any accompanying statement)☐ as amended under Article 34the drawings ☐ as originally filed☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: .....English.....

☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

## Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |        |
|--|---|--------|
| 1. translation of international application                              | : | sheets |
| 2. amendments under Article 34   | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : | sheets |
| 5. letter  | : | sheets |
| 6. other (specify)   | : | sheets |

For International Preliminary Examining Authority use only

received not received

|                          |                          |
|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> | <input type="checkbox"/> |

The demand is also accompanied by the item(s) marked below:

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet                             | 4. <input type="checkbox"/> statement explaining lack of signature                                  |
| 2. <input type="checkbox"/> separate signed power of attorney                            | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other (specify):  |

## Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



Stephen Geoffrey HALE

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. ☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum)

PA 3382

## Box No. I TITLE OF INVENTION

PHOTOSENSITIVE PLASTICS FILMS AND INFORMATION STORAGE DEVICES

## Box No. II APPLICANT

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

CPFilms Inc  
P.O. Box 5068,  
Martinsville,  
Virginia 24115,  
United States of America.

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality: (Delaware)  
United States of America

State (that is, country) of residence:  
United States of America.

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

## Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

HAWKINS, Michael  
18 Mount Ned Way,  
Coventry,  
CV5 7GX,  
United Kingdom

This person is:

☐ applicant only☒ applicant and inventor☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
United Kingdom

State (that is, country) of residence:  
United Kingdom

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

## Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent☐ common representative

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.)

HALE, Stephen Geoffrey  
J.Y. & G.W. Johnson  
Kingsbourne House,  
229-231 High Holborn,  
London WC1V 7DP,  
United Kingdom

Telephone No.

0207 405 0356

Facsimile No.

0207 831 9628

Teleprinter No.

☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the name above is used instead to indicate a special address to which correspondence should be sent.

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NEWBITT, David Michael  
15 Hann Road,  
Rownhams,  
Southampton,  
SO16 8LN,  
United Kingdom.

This person is:

- ☐ applicant only  
☒ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

United Kingdom

State (that is, country) of residence:

United Kingdom

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only  
☐ applicant and inventor  
☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

**Box No.V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

**National Patent** (if other kind of protection or treatment desired, specify on dotted line):

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> AE United Arab Emirates                  | <input checked="" type="checkbox"/> LR Liberia                                   |
| <input checked="" type="checkbox"/> AL Albania                               | <input checked="" type="checkbox"/> LS Lesotho                                   |
| <input checked="" type="checkbox"/> AM Armenia                               | <input checked="" type="checkbox"/> LT Lithuania                                 |
| <input checked="" type="checkbox"/> AT Austria                               | <input checked="" type="checkbox"/> LU Luxembourg                                |
| <input checked="" type="checkbox"/> AU Australia                             | <input checked="" type="checkbox"/> LV Latvia                                    |
| <input checked="" type="checkbox"/> AZ Azerbaijan                            | <input checked="" type="checkbox"/> MD Republic of Moldova                       |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina                | <input checked="" type="checkbox"/> MG Madagascar                                |
| <input checked="" type="checkbox"/> BB Barbados                              | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria                              | <input checked="" type="checkbox"/> MN Mongolia                                  |
| <input checked="" type="checkbox"/> BR Brazil                                | <input checked="" type="checkbox"/> MW Malawi                                    |
| <input checked="" type="checkbox"/> BY Belarus                               | <input checked="" type="checkbox"/> MX Mexico                                    |
| <input checked="" type="checkbox"/> CA Canada                                | <input checked="" type="checkbox"/> NO Norway                                    |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> NZ New Zealand                               |
| <input checked="" type="checkbox"/> CN China                                 | <input checked="" type="checkbox"/> PL Poland                                    |
| <input checked="" type="checkbox"/> CU Cuba                                  | <input checked="" type="checkbox"/> PT Portugal                                  |
| <input checked="" type="checkbox"/> CZ Czech Republic                        | <input checked="" type="checkbox"/> RO Romania                                   |
| <input checked="" type="checkbox"/> DE Germany                               | <input checked="" type="checkbox"/> RU Russian Federation                        |
| <input checked="" type="checkbox"/> DK Denmark                               | <input checked="" type="checkbox"/> SD Sudan                                     |
| <input checked="" type="checkbox"/> EE Estonia                               | <input checked="" type="checkbox"/> SE Sweden                                    |
| <input checked="" type="checkbox"/> ES Spain                                 | <input checked="" type="checkbox"/> SG Singapore                                 |
| <input checked="" type="checkbox"/> FI Finland                               | <input checked="" type="checkbox"/> SI Slovenia                                  |
| <input checked="" type="checkbox"/> GB United Kingdom                        | <input checked="" type="checkbox"/> SK Slovakia                                  |
| <input checked="" type="checkbox"/> GD Grenada                               | <input checked="" type="checkbox"/> SL Sierra Leone                              |
| <input checked="" type="checkbox"/> GE Georgia                               | <input checked="" type="checkbox"/> TJ Tajikistan                                |
| <input checked="" type="checkbox"/> GH Ghana                                 | <input checked="" type="checkbox"/> TM Turkmenistan                              |
| <input checked="" type="checkbox"/> GM Gambia                                | <input checked="" type="checkbox"/> TR Turkey                                    |
| <input checked="" type="checkbox"/> HR Croatia                               | <input checked="" type="checkbox"/> TT Trinidad and Tobago                       |
| <input checked="" type="checkbox"/> HU Hungary                               | <input checked="" type="checkbox"/> UA Ukraine                                   |
| <input checked="" type="checkbox"/> ID Indonesia                             | <input checked="" type="checkbox"/> UG Uganda                                    |
| <input checked="" type="checkbox"/> IL Israel                                | <input checked="" type="checkbox"/> US United States of America                  |
| <input checked="" type="checkbox"/> IN India                                 | <input checked="" type="checkbox"/> UZ Uzbekistan                                |
| <input checked="" type="checkbox"/> IS Iceland                               | <input checked="" type="checkbox"/> VN Viet Nam                                  |
| <input checked="" type="checkbox"/> JP Japan                                 | <input checked="" type="checkbox"/> YU Yugoslavia                                |
| <input checked="" type="checkbox"/> KE Kenya                                 | <input checked="" type="checkbox"/> ZA South Africa                              |
| <input checked="" type="checkbox"/> KG Kyrgyzstan                            | <input checked="" type="checkbox"/> ZW Zimbabwe                                  |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea |  |
| <input checked="" type="checkbox"/> KR Republic of Korea                     |  |
| <input checked="" type="checkbox"/> KZ Kazakhstan                            |  |
| <input checked="" type="checkbox"/> LC Saint Lucia                           |  |
| <input checked="" type="checkbox"/> LK Sri Lanka                             |  |

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- ☒ CR Costa Rica  
☒ DM Dominica  
☒ TZ Tanzania

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)



| Box No. VI PRIORITY CLAIM                                 |                                  | <input type="checkbox"/> Further priority claims are indicated in the Supplemental Box. |   |  |
|---|----------------------------------|---|---|--|
| Filing date<br>of earlier application<br>(day month year) | Number<br>of earlier application | Where earlier application is:   |   |  |
|   |                                  | national application:<br>country  | regional application:*<br>regional Office | international application:<br>receiving Office |
| item (1)<br>18 Sept 1998<br>(18.09.98.)                   | 9820317.7                        | GB  |   |  |
| item (2)  |                                  |   |   |  |
| item (3)  |                                  |   |   |  |

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(iii)). See Supplemental Box.

#### Box No. VII INTERNATIONAL SEARCHING AUTHORITY

**Choice of International Searching Authority (ISA)**  
(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

**Request to use results of earlier search; reference to that search** (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day month year)

Number

Country (or regional Office)

ISA /

#### Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 4  
description (excluding sequence listing part) : 8  
claims : 2  
abstract : 1  
drawings :  
sequence listing part of description :  
Total number of sheets : 15

This international application is accompanied by the item(s) marked below:

1. ☐ fee calculation sheet
2. ☐ separate signed power of attorney
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other (specify):

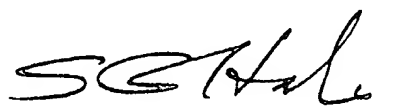
Figure of the drawings which should accompany the abstract:

Language of filing of the international application:

English

#### Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Stephen Geoffrey HALE

| For receiving Office use only   |  | 2. Drawings:<br><br><input type="checkbox"/> received:<br><br><input type="checkbox"/> not received: |
|---|--|--|
| 1. Date of actual receipt of the purported international application:   |  |  |
| 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: |  |  |
| 4. Date of timely receipt of the required corrections under PCT Article 11(2):  |  |  |
| 5. International Searching Authority (if two or more are competent): ISA /  | 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid. |  |

| For International Bureau use only                               |  |
|---|--|
| Date of receipt of the record copy by the International Bureau: |  |